

multi-optional systems

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more possibilities for
creative engineering

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multi-optional systems

Since 2001, **metrom** has stood for precision and dynamics when controlling the tool center point. With a unique machine set-up, various customer-specific technologies are freely integrated and combined. This creates new machining possibilities with enormously high speeds.

Three precisely coordinated components form the basis of all **metrom** systems:

- 1 The temperature-stabilized frame in the form of an icosahedron takes the highest extreme processing forces. It secures a large spindle space in a compact size workspace.
- 2 The metrom systems are equipped with the patented 5-strut parallel kinematics consisting of precision ball screws with direct rotary drives. Thus, extremely high accelerations can occur at the operating point with minimal wear.
- 3 High-performance CNC control allows for simultaneous movements of various axes for different cycles and machining processes.

metrom systems are available in stationary or mobile version.

multi-optional systems

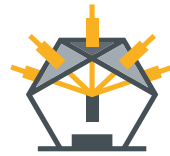
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principle and applications



frame with high rigidity



backlash free joints



workpiece loading



machine positioning



technologies



loading by table



from top



welding



5-axis HSC-milling



cabin



angular



out-of roundturning



laser welding



production flow



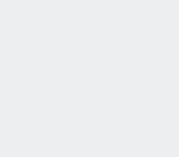
lateral



water cutting



friction stir welding



additive manufacturing



hanging



additive manufacturing



and more

mobile 5-axis-machine tool

processing of large workpieces directly on site

mobile machine tool in horizontal frame



- ▶ movement of the machine to the workpiece
- ▶ accuracy and dynamics of a machining center
- ▶ machining in workpiece coordinates
- ▶ realignment to the next position
- ▶ high speed machining
- ▶ drilling, tapping



mobile machine tool in vertical frame

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flexibility of a robot - stiffness of a machining center

		PM1000	PM1400	PM2000
working envelope				
max. diameter	mm	1.000	1.400	2.000
z - travel	mm	600	800	1.000
drive system				
max. feed rate of the parallel kinematic		up to 60.000 mm/min		
max. acceleration in all directions of the parallel kinematic		up to 10 m/s ²		
accuracy full working envelope				
positioning accuracy	mm	±0,025		
repeatable accuracy	mm	0,003		



transportation to customer



gas & turbine



pressure vessels



water power



adjustment by laser tracker



wind energy

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machining centers

universal solutions for precision machining



P1000



P2030

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		P1000	P1400	P2000
workpiece size (5-sided machining)				
X - / Y - dimensions	mm	1.000 x 1.000	1.400 x 1.400	2.000 x 2.000
workpiece diameter	mm	Ø 1.400	Ø 2.000	Ø 2.800
Z - dimension	mm	600	700	1.000
drive system				
max. feed rate of the parallel kinematic		60.000 mm/min	60.000 mm/min	45.000 mm/min
max. acceleration in all directions of parallel kinematic		10 m/s ²	10 m/s ²	8 m/s ²
accuracy in full working envelope				
positioning accuracy	mm	±0,010	±0,020	±0,025
repeatable accuracy	mm	0,003		

round tables (torque drive) as 6th axis:

max. Drehzahl: 180 min⁻¹ till 350 min⁻¹
 table size: 800 mm till 2000 mm
 max. table load: 900 till 12.000 kg

linear axis as 7th axis:

linear travel: 800 mm till 5000 mm

main spindles (standard):

tool holder : HSK-A63 / HSK-A80
 power (S1): 14 kW / 25 kW / 30 kW
 max. rpm: 24.000 min⁻¹ / 15.000 min⁻¹ / 12.000 min⁻¹
 engine torque: 28 Nm / 64 Nm / 115 Nm

further options:

automatic tool changer (5 till 120 positions)
 tool measurement device, chip conveyor, extraction system,
 cooling lubricant system, minimum quantity lubrication system, workpiece changing automation



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application samples

metals

material: 1.2343 - X38CrMoV 5 1

tool: D 40mm R4
number of flute: z = 6
cutting speed: $V_c = 380 \text{ m/min}$
rpm: $n = 3.000 \text{ U/min}$
feed rate: $F = 10.000 \text{ mm/min}$
feed per tooth: $Z_n = 0,55 \text{ mm}$
cutting width: $a_e = 32 \text{ mm}$
cutting depth: $a_p = 1 \text{ mm}$

time span volume: $320 \text{ cm}^3/\text{min}$



material: 1.0045 - S 355 JR

tool: D 50mm
number of flute: z = 4
cutting speed: $V_c = 310 \text{ m/min}$
rpm: $n = 2000 \text{ U/min}$
feed rate: $F = 8.000 \text{ mm/min}$
feed per tooth: $Z_n = 1,0 \text{ mm}$
cutting width: $a_e = 50 \text{ mm}$
cutting depth: $a_p = 1,5 \text{ mm}$

time span volume: $600 \text{ cm}^3/\text{min}$



material: 3.4365 - AlZnMgCu1,5

tool: D 16mm
number of flute: z = 3
cutting speed: $V_c = 650 \text{ m/min}$
rpm: $n = 13.000 \text{ U/min}$
feed rate: $F = 12.000 \text{ mm/min}$
feed per tooth: $Z_n = 0,3 \text{ mm}$
cutting width: $a_e = 10 \text{ mm}$
cutting depth: $a_p = 15 \text{ mm}$

time span volume: $1.800 \text{ cm}^3/\text{min}$



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non metals

material: carbon fiber

tool: D 12mm
number of flute: $z = 2$
cutting speed: $V_c = 800 \text{ m/min}$
rpm: $n = 21.000 \text{ U/min}$
feed rate: $F = 4.200 \text{ mm/min}$
feed per tooth: $Z_n = 0,1 \text{ mm}$
cutting width: $a_e = 12 \text{ mm}$
cutting depth: $a_p = 1 \text{ mm}$

time span volume: $50 \text{ cm}^3/\text{min}$



material: plastics Necuron 1020

tool: D 50mm
number of flute: $z = 4$
cutting speed: $V_c = 790 \text{ m/min}$
rpm: $n = 5.000 \text{ U/min}$
feed rate: $F = 10.000 \text{ mm/min}$
feed per tooth: $Z_n = 1,0 \text{ mm}$
cutting width: $a_e = 25 \text{ mm}$
cutting depth: $a_p = 10 \text{ mm}$

time span volume: $2.500 \text{ cm}^3/\text{min}$



material: resin-bonded casting sand

tool: D 80mm
number of flute: $z = 10$
cutting speed: $V_c = 500 \text{ m/min}$
rpm: $n = 2.000 \text{ U/min}$
feed rate: $F = 2.000 \text{ mm/min}$
feed per tooth: $Z_n = 1,0 \text{ mm}$
cutting width: $a_e = 80 \text{ mm}$
cutting depth: $a_p = 10 \text{ mm}$

time span volume: $12.800 \text{ cm}^3/\text{min}$



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- ▶ unique dynamic accuracy
- ▶ working feed rate up to 60.000 mm/min
- ▶ maximum stiffness for maximum cutting performance
- ▶ maximum energy efficiency due to moving small masses
- ▶ ideal for processing free-form surfaces
- ▶ thermal management system provides temperatures control of all relevant components
- ▶ ease of maintenance due to standardized components



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